SHANGHAITECH UNIVERSITY
School of Information Science and Technology
CS271: Computer Graphics II
Spring 2021
Programming Assignment 5
Released: Thursday, April 29, 2021
Due: Monday, May 18, 2021

In the last assignment, you have gotten familiar with the half-edge data structure. Now you are ready to move on to learn some commonly used mesh processing techniques. Specifically, in this assignment, you are required to implement the following functionalities.

- ✓ Compute the normal of each vertex. Compute the normal for a vertex and use the normal to perform smooth shading.
- ✓ Compute and visualize mean curvature. You are required to compute the mean curvature at each vertex and display the curvatures using a color ramp.
- ✓ Laplacian smoothing. Implement both the explicit and implicit Laplacian smoothing schemes using the uniform weights and the cotangent weights. For the implicit method, you need to solve a sparse linear system. It is recommended to use the iterative conjugate gradient method, which is outlined on page 32 of the article painless conjugate gradient by Shewchuk.

Please refer to the supplemental material for more details. You may build upon the code given for Programming Assignment 4.

Submission

Please submit your zipped file with a name “CS271_[Your full name]_[Your student ID]”. You should submit both your source code as well as an executable file. Please also submit a report containing the following information:

- ✓ A description of how to use your program, e.g., the UI for Laplacian smoothing.
- ✓ Screenshots of program output, including:
  - ■ Displayed mesh in the smooth shaded mode.
  - ■ Displayed colored mean curvature.
  - ■ Zoom in views of the mesh before and after Laplacian smoothing.
  - ■ Your conclusion on the smoothing part, including a comparison between the two schemes and your own insight on the parameters, timing, etc.

If any special library is used, please state it in the report.